The pen-and-paper assignment consists of the following two questions:

1. What is the role of sampling from the posterior distribution? Why is it important?

**Answer:** Sampling from the posterior distribution means that we model and simulate our data based on our posterior distribution. When we have a limited dataset and no sampling, the inferences we get from the data will not be enough for our purposes. And as we do sampling and simulation, our dataset will be more comprehensive and exhaustive. With a comprehensive dataset, inferences we will attempt to get from the data will be more reliable, and our insights would be more relevant.

2. What is the posterior predictive distribution, and how does it differ from a posterior distribution.

Illustrate using the following example in which we want to find the probability that Y is a vampire, after we failed to see Y's image in the mirror once.

P(X is a vampire) = .01

P(X's reflection in the mirror not visible [on a particular occasion] | X is a vampire) = .99

P(X's reflection in the mirror not visible [on a particular occasion] | X is mortal) = .10

**Answer:** Posterior predictive distribution embodies all priors. It somewhat diminishes our overconfidence over the prior we have. After we failed to see Y's image in the mirror, there is still a probability of not being a vampire. And with posterior predictive distribution, we take those probabilities into consideration too.